17-15 66

NASA GRANT NO. NAG 5-1446

FINAL TECHNICAL REPORT

Submitted to the

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

GODDARD SPACE FLIGHT CENTER

"PARTICIPATION IN THE NORTH ECLIPTIC POLE SKY SURVEY"

September 15, 1990 to September 14, 1992

Submitted by

J. PATRICK HENRY
Professor

UNIVERSITY OF HAWAII
INSTITUTE FOR ASTRONOMY
2680 Woodlawn Drive
Honolulu, Hawaii 96822

Grant NAG 5-1446 supported research into the nature of the faintest X-ray sources found in the ROSAT All Sky Survey, with particular emphasis on distant clusters of galaxies. Due to the scan pattern used to conduct the survey, these sources are at the North Ecliptic Pole (NEP). The project was broadened somewhat because a very deep pointing was make directly at the NEP, one of the deepest pointings that ROSAT is likely to make. Thus we decided to study the nature of the sources detected in this long pointing as well. The project can be logically divided into two parts; acquisition of the X-ray data and identification of the optical counterparts of the X-ray sources. Grant NAG 5-1446 supported both of these parts.

The P.I. spent a sabbatical year at the Max Planck Institute for Extraterrestrial Physics in Garching Germany, where the ROSAT Sky Survey data is being analyzed. This stay was partially supported by the subject grant. The standard processing of the Sky Survey has proceeded extremely slowly. The data have yet to be merged beyond ninety-two degree wide strips, which severely limits the sensitivity at the NEP which is in every strip. Thus we have merged the strips and detected the sources using off line programs. There are approximately 700 sources in the 9 X 9 square degree region around the NEP, including 43 from the long pointing. At present we are merging the exposure files in order to provide the exposure for each source and thence it's flux. Optical data from the Edinburgh/NRL digital scans of this region were used to aid in the optical identification process; that is, we made paper finding charts for each source. These finding charts were made in Garching.

Due to the depth of the X-ray data, and also because the NEP may only be observed in the summer, the optical identification program has proceeded slowly. At present, we have identified approximately 30 distant cluster candidates ($z > 0.3$) and 2 very distant ($z \sim 0.5$) clusters. The very distant clusters come from a complete sub-sample of 25 objects in the long pointing. Of these 25, only 7 remain unidentified. When this sample is identified, it will be the first of the ROSAT very deep fields which is completely identified.

A paper giving our expectations for the clusters that will be detected in the NEP region, based on our present theoretical understanding of their nature, has been published in ApJ 383, 95, 1991.